

PATENT SPECIFICATION



Convention Date (Germany) : July 18, 1934.

446,462

Application Date (in United Kingdom) : July 18, 1935.

No. 20502/35.

Complete Specification Accepted : April 30, 1936.

COMPLETE SPECIFICATION

Improvements in or relating to Delivery Apparatus for Sheet Printing Machines

We, MASCHINENFABRIK AUGSBURG-NÜRNBERG AKTIENGESSELLSCHAFT, of 7, Stadtbachstrasse, Augsburg, Germany, a Joint Stock Company organised under German law, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to delivery apparatus for sheet printing machines.

In the known delivery apparatus for sheet printing machines the sheet on being delivered on to the pile is released by the gripper and descends by its own weight on to the pile, whilst at the same time it remains subjected to the action of the horizontal velocity which it possessed at the moment of its release. It is therefore, particularly with high outputs of the machine, difficult to obtain an exactly uniformly laid pile; inasmuch as the sheets, in consequence of their own velocity, descend in different ways on to the pile. Difficulties arise also particularly when the speed of the machine is altered, inasmuch as the position of the eccentric which opens the grippers is dependent on the speed and must be altered together with the latter. In the known machines it is also not possible to effect the operations without a sheet pushing member which is complicated and expensive. In particular, it is almost impossible with electrically charged papers to obtain a pile which is entirely accurately registered, inasmuch as the sheets adhere tightly to one another and therefore to not permit of being displaced one over the other.

It has already been sought to eliminate these drawbacks by arranging that the sheet is guided not only at its front edge by means of front grippers, but also at its rear edge by means of succeeding grippers. In one of these known devices, however, in consequence of the difference in the velocities of the two gripper systems, the front grippers must at the moment when the sheet is gripped, be opened by the succeeding grippers and it

is therefore difficult to grip the sheet with certainty. Moreover, in this known arrangement the sheet is not retarded until its horizontal velocity is zero. In another arrangement of this kind the succeeding grippers have at that moment of gripping the sheet likewise a smaller velocity than the sheet itself; moreover, in this arrangement although the sheet is retarded until its horizontal velocity is zero it is not guided up to the end position on the pile.

It is the object of the invention to eliminate these drawbacks. This object is, according to the invention, attained by arranging that the sheet is gripped not only at its front edge but also at its rear edge by grippers, which retard it after it has been released by the front grippers, which are guided on an endless chain and which grip the sheet after passing the chain wheel located at a greater distance from the pile, and guide it during the course over the chain wheel located nearest to the pile positively up to its end position on the pile whilst retarding its horizontal velocity down to the zero point.

The principal advantage of the new sheet delivery device resides in the fact that the sheets can be positively guided up to the moment of delivery on to the pile and retarded up to the point at which their horizontal velocity becomes zero. It is therefore possible to lay them accurately up against a stop which is located at the rear edge of the sheet pile. The sheet lays itself after it has been released by the front grippers and retarded by the rear grippers, in consequence of its vertical velocity. With this arrangement it is possible to do without a sheet pusher entirely. Inasmuch as the sheet is positively guided up to the moment of delivery, electric charges on the sheet also do not cause disturbances in the delivery operation.

A further advantage of the new arrangement resides in the fact that it is possible to construct the front stop, which is arranged so as to be adjustable for the purpose of adaptation to different sheet sizes, in such manner that it can be flapped

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over. This renders it possible to take off a sheet or sheets from the pile during the working operation.

A preferred constructional form of a sheet delivery apparatus according to the invention is illustrated diagrammatically by way of example in the accompanying drawing, in which:

Fig. 1 shows a sheet delivery apparatus according to the invention in side view,

Fig. 2 shows a detail in side view, and Fig. 3 is a sectional view of a detail.

The numerals 1 and 2 denote respectively the impression cylinder and the forme cylinder of an intaglio printing machine. For taking off the sheets from the impression cylinder 1 the gripper chain 3 with the grippers 4 serves. The grippers 4 grip the sheet in known manner at its front end and draw it over the steel bars 5. These bars are fixed at the one side to the supporting bars 6 and are downwardly bent in a vertical direction, their vertically directed part, which serves at the same time as the rear stop for the sheet pile, being fixed to supporting bars 7. One only of each of the bars 6 and 7 is shown on the drawing. The sheets 8 running on the steel bars 5 are gripped at their rear end by the grippers 9 which are carried on a second chain 10. This chain runs over the chain wheels 11 and 12. The chain grippers grip the rear end of the sheets 8 as soon as they have passed the chain wheel 11 and run into the straight line course, i.e. at the point 13. The grippers 9 move at the same speed as the grippers 4 which grip the front edge of the sheet. The grippers 4 lead the front end of the sheet over the sheet pile 14 and open when the grippers 9 have reached a point actually above the position 9'. When the grippers 9 have reached the point 9', the front grippers 4 have moved forward empty to the point 4'. From this point the grippers 9 run over the chain wheel 12 and its horizontal velocity is thus retarded down to zero. The zero value is attained by the grippers 9 in the position 9'. At this moment the grippers 9 open and deliver the sheet on to the pile 14, the table carrying the pile being, of course, lowered automatically after a certain pile height has been reached. The sheet is retarded in corresponding manner from its maximum velocity down to zero, which is attained at the moment of delivery. The sheets are delivered with their rear edge up against the vertical part of the bars 5. In certain circumstances the sheet is not released at the moment at which the grippers 9 come to rest, but a moment later after it has again acquired a small horizontal velocity in the opposite

direction, in order to guide the sheets towards the stop bars 5.

In order that the grippers 9 always maintain their operative position in relationship to the sheet 8, they are rigidly connected with a lever 15, the lower end of which is guided on a chain 16 in exactly the same sense as the grippers 9. The chain 16 runs over the chain wheels 17 and 18. The lever 15 and grippers 9 thus maintain always the same position in space.

The two spur wheels 19 and 20, which are rigidly connected to the chain wheels 11 and 17, are driven by means of the spur wheel 21 which is mounted with a toothed wheel formed of a hub member 27 and a toothed crown 23 on a shaft 24. The toothed crown 23 is driven through the medium of the intermediate wheels 25 and 26 from the impression cylinder 1. The hub 27 and toothed crown 23, are connected together by means of the ring 29 and the screws 30. The toothed crown 23 can, after loosening of the screws 30, be turned relatively to the hub 27 thereby enabling the distance of the grippers 9 from the grippers 4 to be varied and enabling sheets of different length or size to be dealt with.

It will be appreciated that the above described driving mechanism is, of course, duplicated at the opposite side of the sheet.

Finally, in order to render it possible to draw off a sheet from the sheet pile 14 and to check it during the running of the machine, the upper part of the front sheet stop 31 is adapted to be flapped over around the point 32. The uppermost sheet can then be taken out. The chain 15 can, of course, be screened so that there is no danger of wounding the hand of the workman.

Having now particularly described and ascertained the nature of our said invention, and in what manner the same is to be performed, we declare that what we claim is:—

1. Delivery apparatus for sheet printing machines in which the sheet before delivery on to the pile is gripped not only at its front edge but also at its rear edge by grippers, which latter move in the same direction as the front grippers and retard the sheet after it has been released by the front grippers, characterised in that the succeeding grippers (9) are guided on an endless chain and grip the sheet (8) after passing the chain wheel (11) located more remote from the pile (14), and that they guide the sheet during their course positively over the chain wheel (12) located nearest to the pile up to the end position of the sheet on the

pile, whilst retarding the sheet in a manner known *per se* until its horizontal velocity is reduced to zero.

5 2. Delivery apparatus according to claim 1, characterised in that the succeeding grippers (9) during the period from the time when they grip the sheet up to the time of release of the latter by the front grippers have the same velocity as these latter.

10 3. Delivery apparatus according to claim 1, characterised in that at the moment at which the succeeding grippers (9) grip the rear edge of the sheet, the sheet rests on a flat support.

15 4. Delivery apparatus for sheet printing machines according to claim 1, characterised in that the delivery grippers (9) which grip the sheet (8) at its rear edge are maintained in position by means of a lever (15), the other end of which is

guided along a guide (16) in the same sense as the said grippers (9) themselves.

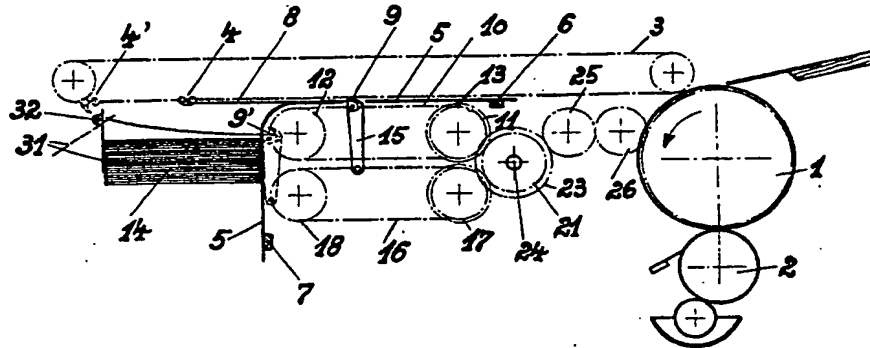
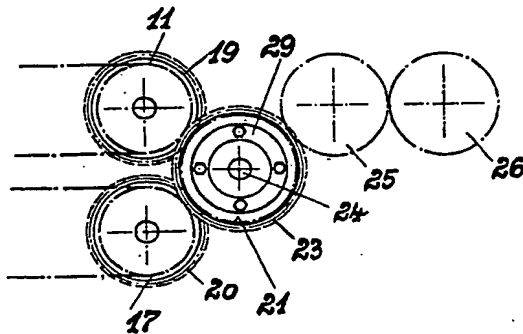
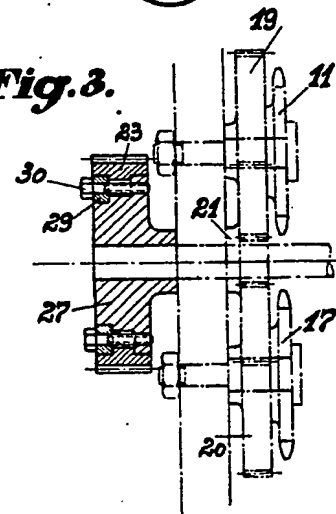
25 5. Delivery apparatus according to claim 1, characterised in that for the purpose of dealing with sheets (8) of different lengths the grippers (9) which grip the rearwardly directed edge of the sheet are arranged so as to be adjustable with regard to the front grippers (4).

30 6. Delivery apparatus for sheet printing machines, substantially as described with reference to the accompanying drawings.

Dated this 18th day of July, 1935.

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Fig. 1.**Fig. 2.****Fig. 3.**

Malby & Sons, Photo-Lith.

Docket # A-3824

Applic. # _____

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